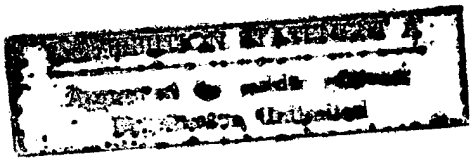
JPRS-CST-86-014

21 APRIL 1986

China Report

SCIENCE AND TECHNOLOGY



FBIS FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-CST-86-014

21 April 1986

CHINA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

ABSTRACTS

NATIONAL DEVELOPMENTS

IMPORTING TECHNOLOGY, REFORM OF S&T SYSTEM DISCUSSED

Beijing GUANGMING RIBAO in Chinese 29 Jan 86 p 3

[Article by Kang Rongping [1660 2837 1627] and Xie Xiezheng [6200 3610 2973]: "Technology Imports and Reforms in S&T Systems"]

[Text] Since the 3d Plenum of the 11th CPC Central Committee, China has implemented an open door policy and made this a long-term basic national policy and strategic measure. This has provided China's economic system with the ability to absorb the most modern S&T achievements. The primary task involved in opening up to the outisde is to import and use advanced technologies (including management technologies) from foreign countries to ensure that China will be able to achieve the medium-term goals of "adopting advanced production technologies adapted to China's needs that were common throughout the developed nations during the 1970's or early 1980's and popularizing them in China's industrial enterprises to form a technical system that is particularly Chinese by the end of this century" and the long-term goal of "basically catching up with the developed nations by 2030 or 2050." Comrade Deng Xiaoping made it quite clear that "the open door policy is very important since it is impossible for any nation to develop if it stands alone and closes itself off. If we are to achieve the first and second stage goals, we must open up and strengthen international exchanges, and we must import advanced experiences, advanced S&T achievements and capital from the developed nations. We cannot close our doors. This is called an open door policy" (LIAOWANG [OUTLOOK] No 37, 1985 p 11). In our future economic and technical development, we should abandon the past principle of closing off the country and "depending on oneself for everything" and import and absorb advanced S&T achievements from foreign countries to the greatest possible extent. In an age in which even the United States and the Soviet Union, scientific and technical superpowers, think that "depending on oneself for everything" is unfeasible, there is no doubt that China's new strategic principles are extremely correct.

One serious situation has not received sufficient notice, however, which is that S&T systems built up in China over the past 30 years are not adapted to this new strategic principle.

S&T systems in most countries of the modern world perform two basic functions: One is the function of relying mainly on a nation's own intellectual resources for self-development, and the other is the function of using all of the world's advanced S&T achievements as important resources for development and utilization and to import, digest, absorb and recreate advanced technologies from foreign countries. This can be called the absorption-development function.

This function is indispensable in the modern world. Of course, the ratio between the two types of functions in different countries and at different times may vary, and furthermore, the two functions usually are organically integrated, which makes it hard to separate them precisely. The S&T systems that have been built in China over the past 30 years basically have only the first function, a system of "self-development" from top to bottom. On one hand, this system sacrifices the grassroots levels, particularly S&T development forces within enterprises, to establish "pure" scientific research organs. On the other hand, the research and development work done in these scientific research organs basically involves "comprehensive catching up and overtaking" and they mainly select their topics and research themselves. The problem is that this sort of system has no special funds for some of the most important research activities related to importing and absorbing advanced S&T achievements from foreign countries for further development and utilization, digesting, absorbing and recreating the imported technologies and so on and they have no specialized organs or staffs to guarantee them. One basic function obviously is missing from the S&T system that has been built in China, which is a specialized absorption-development functional part that is responsible for digesting, absorbing and developing new S&T achievements from foreign countries.

We cannot avoid making a comparison with some situations in Japan during the "absorption strategy" it adopted during the 1950's and 1960's. Japan has been one of the world's biggest spenders on research for digestion and development of foreign technology imports since the 1950's and its proportion also is the highest. According to a survey in Japan's (Tongchan) Province, one-third of total expenditures on research and development throughout Japan from 1957 to 1962 were used for research projects related to technology imports. Annual research and development expenditures in Japanese enterprises generally accounted for 65 to 70 percent of total national expenditures. During the 1960's, about 75 percent was used to digest and improve imported technologies. Many research institutes in Japan were engaged in digestion and absorption of foreign technologies and there was a sizeable contingent of S&T personnel engaged in digesting and absorbing foreign technologies. It can be said that the functional component of Japanese S&T systems engaged specifically in digesting, absorbing and developing foreign technologies during the 1950's and 1960's was the strongest part. This system was totally adapted to Japan's strategic principles at that time and guaranteed that the strategic goal--catching up with advanced world levels--would be achieved smoothly. Of course, we cannot simply imitate Japan's "absorption strategy" of that period, but comparison of China today and its strategic focus on absorption on new foreign S&T achievements with the Japan of that time quite possible may illustrate some issues.

We know that the basic goal of importing advanced foreign technologies is not to purchase some equipment and production lines to expand productive capacity (advanced equipment becomes backward within a few years!). Instead, the goal is to improve our technical levels and reinforce our own capacity for self-development and self-reliance. If our system lacks an excellent capacity for digestion, absorption, development and recreation, we always will remain in a situation of importing "the first, second and even third machines." The goals mentioned above would not be attainable and work throughout technology imports would get only half the results with twice the effort.

We feel that guaranteed implementation of the new strategic principles requires additional reforms in existing S&T systems to change them from self-development systems into new systems that integrate digestion and absorption with self-development. One important aspect of the reforms should be an effort to build up and reinforce the functional component for digesting and absorptton of advanced foreign S&T achievements, and to integrate it organically with the original self-development function. To achieve this, we are suggesting certain indicies (short-term goals) that should be achieved in reforms in this area: 1) Within 3 to 5 years, build (mainly rebuild) a group of S&T organs especially for absorption and digestion of advanced foreign technologies and see that they develop and innovate on this foundation. In number, they should exceed 20 percent of the total number of scientific research organs in China (for local scientific research organs in coastal areas, the percentage should be greater than 50); 2) In research expenditures, the administrative expenditures used specifically for digestion, absorption and development of advanced foreign technologies should reach 20 to 25 percent of total expenditures on scientific research in China within the next 3 to 5 years. 3) Strive to deploy S&T forces in enterprises. The first thing is to work quickly to establish a group of S&T staffs and factory-run scientific research institutes in large and medium-sized enterprises. 4) In S&T award systems, strive to increase the number of awards for digestion and extension of technology imports for personnel and units that have been successful in development and innovation on the basis of technology imports. Furthermore, since China's overall management system includes economic production departments that handle imports and scientific research departments that handle research and development and lack organic links conducive to digestion, absorption, and development of technology imports between the two groups of departments, we propose that China begin with the overall situation to formulate the following policies and regulations: technology import projects at a moderate scale and above (a suitable standard based on expenditures should be set) should guarantee scientific and technical capacities to digest and absorb (whether by their own S&T forces, by signing the relevant contracts with scientific research organs, or by having certificates of guarantee provided by related departments with S&T reserve strengths) before they can receive approval. In addition, greater adaptability in the digestion and absorption functions in S&T systems requires that S&T management departments have specific managerial authority in the area of technology imports so that S&T management departments and economic management departments take joint responsibility for management work related to technical import projects.

12539/13104
CSO: 4008/2069

NATIONAL DEVELOPMENTS

BEIJING AWARDS ADVANCED SCIENCE PRIZES

OW210353 Beijing XINHUA in English 0241 GMT 21 Mar 86

[Text] Beijing, 21 Mar (XINHUA)--Beijing Municipal Government today awarded advanced science prizes to scientific bodies and workers who made 378 outstanding scientific achievements last year.

An adjudication committee of 200 senior scientists chose the prize winners from 2,400 important scientific results made in the capital last year.

The achievements have been made in industry, agriculture, forestry, capital construction, building materials, medicine, environmental protection, communications and energy saving.

Some represent important steps forward in research, while others have brought great economic or social benefits, the committee held.

First prize was awarded to a joint scheme by Beijing Agriculture University and the Genetics Research Institute of the Chinese Academy of Sciences.

We spent nine years breeding a Beijing white hen, which has a high egg yield while eating less than most breeds. Their results are now being put into practice all over the country.

/9274
CSO: 4010/2010

NATIONAL DEVELOPMENTS

SHANGHAI RESEARCH INSTITUTIONS MARKET TECHNOLOGY

OW131032 Beijing XINHUA in English 0728 GMT 13 Mar 86

[Text] Shanghai, 13 Mar (XINHUA)--Scientific research institutions in Shanghai, China's largest industrial city, have sold 580 million yuan-worth of new technological systems in the past year--five times the figure for 1984.

City officials said here today the institutions used to do their research without much investigation into the needs of production, and used to transfer their technological achievements gratis to enterprises.

The practice made scientists unaware of the actual needs of production, and discouraged the institutions, the officials noted.

They said the marketing of technological achievements has gone a long way toward solving this problem. In the past five years, they added, 69.5 percent of Shanghai's 5,380 scientific and technological achievements have been applied to production.

There are 300 organizations in Shanghai involved in technology marketing. The municipal technological development and exchange center alone organized almost 100 technical trade fairs last year.

People come to such fairs to seek or offer technical advice, contracts, demonstrations, training, services, information and new products.

The research institutions have also benefited from the marketing of technology, the officials said. Owing to profits earned in this field, 19 of Shanghai's 800-odd research institutions are now doing their research work without financial assistance from the government. Another 40 institutions are also reducing their reliance on government funds.

The officials said some of the city's scientific and technological findings have even been sold abroad.

/9274
CSO: 4010/2010

NATIONAL DEVELOPMENTS

CHINA UNIVERSITY OF S&T NOTES SCHOLAR ACHIEVEMENTS

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 13 Feb 86 p 1

[Article: "Accomplishments of PhD's at the China University of Science and Technology Receive Attention and Praise from Chinese and Foreign Colleagues-Four Scholars Who Went Abroad for Study Make Achievements at International Level"]

[Text] Four visiting scholars from the China University of Science and Technology who were among the first group of Chinese-trained PhD's and went to the United States have made achievements at advanced international levels that have received attention and praise from their Chinese and foreign colleagues. After being approved by the university's Academic Committee, seven of the first group of Chinese-trained PhD's who work at the university were promoted to associate professors.

Under guidance by his teachers, Professors Chen Ziru [7115 1585 0320] and Yin Yongquan [3009 3279 3123], Bai Zhidong [4101 1807 2639], a former graduate student in the Mathematics Department, received his PhD in 1982 and worked at the University of Pittsburgh in 1984. Because of his firm grasp of basic knowledge and lively ideas, he published more than 30 articles covering a very wide range of research on probability and statistics in a little more than 3 years after receiving his doctorate. His Chinese and foreign colleagues consider Dr Bai Zhidong's work to be at international levels and he is a young person receiving considerable attention in the fields of statistics and probability in China. A professor who did cooperative research with him at the University of Pittsburgh said that Bai was "the best PhD he has even seen in more than 20 years."

Li Shangzhi [2621 1424 1807] is a young man from Sichuan's Daba Shan mountains. He joined the first group of Chinese-trained PhD's under the guidance of his teacher Professor Ceng Kencheng [2582 5146 2052]. He was invited to the University of Oregon for cooperative research with Professor (Saichi) an authority on group theory. Originally, Li Shangzhi used only geometric methods to study maximum subgroups. Since 1985, he has studied intensively the matrix methods and skills of the famous mathematicians Hua Weigeng [5478 4850 1649], Wan Zhexian [8001 0772 0341] and other Chinese scholars, and he has employed them to study maximum subgroups. He has published three important articles and made obvious achievements. Professor

(Saici) was extremely appreciative and nicknamed his achievements the "rat theorem" (meaning that it was derived by "beating the hole"). Moreover, it was published in "Algebra," the most prestigious international mathematics magazine. Another famous expert on group theory at the California College of Physics and Engineering also invited Li Shangzhi to come and present an academic report. After going abroad as a visiting scholar, another engineering PhD made obvious achievements and has assumed responsibility for a research organ in the university's computing S&T system.

12539/13104
CSO: 4008/2069

NATIONAL DEVELOPMENTS

SCIENTISTS RETURN FROM ANTARCTIC EXPEDITION

OW151713 Beijing XINHUA in English 1640 GMT 15 Mar 86

[Text] Beijing, 13 Mar (XINHUA)--Fourteen scientists who took part in China's second Antarctic expedition returned here tonight after spending more than three months at the "Great Wall" research station in Antarctica.

The Chinese station on George Island was built in February, last year.

During their stay there, the scientists conducted research in geology, geophysics, meteorology, seismology, high-altitude atmospheric physics, marine biology and glaciation, and collected many specimens.

They also visited research stations set up by Argentina, Chile, the Soviet Union and Uruguay.

The second expedition team was composed of 39 Chinese scientists and two Hong Kong compatriots. The others will return at the end of this month, except for 10 who will remain to conduct surveys in the Antarctic winter.

/9274
CSO: 4010/2010

NATIONAL DEVELOPMENTS

GUANGXI CONVENES SCIENCE, TECHNOLOGY WORK CONFERENCE

HK150307 Nanning Guangxi Regional Service in Mandarin 1100 GMT 14 Mar 86

[Excerpts] A regional conference on science and technology work was held in Nanning from 1 to 14 March. The meeting conveyed the spirit of the national science and technology conference and made arrangements for science and technology work this year and for implementing the spark plan.

Wei Chunshu, chairman of the regional government, spoke on how to improve science and technology service to promote economic development in Guangxi. Regional CPC Committee Secretary Chen Huiguang also spoke. He called on science and technology personnel to take the initiative in going to the township enterprises, the rural areas, mountain regions, poor areas, and places where science and technology is most needed, and regard helping the masses to increase income, eliminate poverty, and get rich as their primary task.

Chen Huiguang also called on the leaders at all levels to care for the intellectuals, make friends with science and technology personnel, and provide them with support and comfort.

Last year the region did a great deal of work in implementing the policies on intellectuals. Over 25,900 intellectual victims of cultural revolution miscarraiges of justice were rehabilitated, representing 96.8 percent of the total number of such cases. Salary adjustments totalling 800,000 yuan were made for 6,300 low-salaried science and technology personnel. Some 12,400 science and technology personnel were recruited into the party.

/9274
CSO: 4008/2081

NATIONAL DEVELOPMENTS

BRIEFS

SCIENTIFIC RESEARCH AT QINGHUA UNIVERSITY--Research collectives that received awards for 103 scientific research achievements in 1985 were issued certificates of merit at a conference convened at Qinghua University on 28 January 1986. Of these achievements, 4 topics received state invention awards, including 1 for salting extraction for distillation of anhydrous absolute ethyl alcohol, while 24 received state scientific and technical progress awards. An additional 75 achievements received awards from various ministries, commissions, provinces and cites and other sources. Qinghua University adhered to the principle of orientation toward economic construction during 1985. It undertook 687 research topics or projects and has more than 2,100 professors, experimental and technical personnel and more than 710 graduate students at the M.A. and Ph.D. levels. A vibrant new atmosphere has appeared. [Text] [Beijing GUANGMING RIBAO in Chinese 29 Jan 86 p 1] 12539/13104

GUANGXI STRUCTURAL REFORM--Scientific research institutes in the region have carried out structural reform, achieving good results. According to incomplete statistics, the income received by these institutes through technological transferrence in 1985 amounted to some 3.5 million yuan, an increase of 160 percent over 1984, or equivalent to 56 percent of the administration fee allocated by the state to them in the whole year. All the 19 regional level scientific research institutes instituted the scientific research contract system last year and signed 336 contracts with relevant departments for various scientific research items, an increase of 36 percent over 1984. In 1985, the 19 scientific research institutes provided 232 technological items to various enterprises inside and outside the region, an increase of 77 percent over 1984. [Summary] [Nanning Guangxi Regional Service in Mandarin 1100 GMT 11 Mar 86 HK] /9274

CSO: 4008/2081

PHYSICAL SCIENCES

GEODESY AND CARTOGRAPHY IN CHINA SURVEYED

Budapest GEODEZIA ES KARTOGRAFIA in Hungarian No 5, 1985 pp 313-321

[Article by Dr Istvan Joo, director of the Geodesy and Cartography Office Main Department, Ministry of Agriculture and Food]

[Text] Many colleagues will certainly agree that the future social, economic, political and professional scientific development of the People's Republic of China is one of the most exciting questions in the world today. If this is true of the world's most populous country (with a population of 1.1 billion) in the mentioned respects, then it must hold true for the professional geodesist as well, regarding geodesy and cartography's actual state of the art in China today and their foreseeable development.

In the spirit of such reflections, this author has already reported years ago on Chinese cartography, respectively on China's geodetic control nets.

On this occasion we would like to make the presented picture more complete, using the available references and the information gathered during a personal visit to China.

The events of the next few years will hopefully confirm that the evolving cooperation between China and the socialist countries is becoming closer and is extending to geodesy and cartography as well.

It is perceptible to everyone that also our country's relations with China are developing favorably. We believe that Hungarian geodesists and cartographers, too, must take part in the cooperation that is unfolding. And so far as I myself am concerned, I likewise want to serve this goal.

We will discuss herein the following: the organization of state geodesy and cartography in China; geodetic and cartographic work, including the networks, topographic surveys, photogrammetry and remote sensing, cartographic activity, and engineering geodesy; and the production of instruments. Finally, we will provide some information about our sister association in China.

1. Organization of State Geodesy and Cartography

Geodetic and cartographic work in China is commissioned by the following:
--The Surveying and Mapping National Bureau;
--The Military Map Service; and

--The individual ministries (but the work is carried out under the professional supervision of the Surveying and Mapping National Bureau).

The total number of specialists at present is about 80,000.

The central agency for surveying and mapping was established in 1956. It was charged with organizing and professionally managing geodetic and cartographic work on a national scale.

In the first phase of its existence, the Surveying and Mapping National Bureau had three branch offices that coordinated the work of the survey units, respectively of scientific research and education, and of the information center and map collection (service). The more important institutions were as follows:

--The Map Publishing Enterprise;
--The Geodesy and Cartography Research Institute;
--Wuhan College of Geodesy, Photogrammetry and Cartography;
--The Publishing House for Geodetic and Cartographic Books and Periodicals; and
--The Geodetic and Cartographic Information Center.

At that time there were about 10,000 persons working under the supervision of the Surveying and Mapping National Bureau.

In 1962--to gather and systematize the local data, and for unified professional supervision--local (provincial) surveying and mapping directorates were created (including also directorates in the autonomous regions and municipalities). These directorates reported to the central government.

In the late 1960's, at the time of the cultural revolution, the Surveying and Mapping National Bureau was abolished. Then in 1973 it was restored, together with the surveying and mapping bureaus in the provinces, autonomous regions, and municipalities.

Three of the provincial bureaus--namely the Shaanxi, Heilongjiang, and Sichuan bureaus (Footnote 1) (All Chinese names in this article, except Peking [Beijing], are rendered in Pinyin)--are under dual (central and local) administration.

By the end of 1981, the personnel of state geodesy and cartography already reached 26,000.

The main task of the provincial and regional bureaus is to prepare large-scale (from 1:10,000 to 1:2000) maps, in accordance with the economic requirements of the given region (and with due consideration for the uniform design, organizational and technical instructions). The aforementioned three special provincial bureaus also perform the basic geodetic and cartographic work of national importance that the Surveying and Mapping National Bureau commissions. Such work includes the following: first- and second-order triangulation, traverse and leveling, astrogravimetric surveys, and network extension; the revision of medium-scale topographic maps; and the design and production of medium-scale and small-scale topographic maps and general-purpose maps.

People's Republic of China
Surveying and Mapping National Bureau
(director, 3 deputy directors, chief engineer)

Production and Technology Research and Education Supervision of Engr Geology Planning and Finance Instruments and Materials Administration Personnel Foreign	Bureau's functional office and departments (abt 100 employees)	Organizations directly under Bureau (abt 3,500 employees) Wuhan Technical University Zhengzhou Technical School Research Institute Map Publishing Enterprise Geodetic, Cartographic Publishing House National Information Center Instrument factories: Shaanxi Hebei Guangdong
Provincial surveying and mapping bureaus: Shaanxi Heilongjiang Sichuan	Three provincial bureaus under dual (central and local) administration (abt 5,000 employees)	Twenty-six provincial, regional and municipal bureaus under local administration and central technical supervision. Including the instrument factories and research institute, each with 500-1,000 staff, a total of abt 17,500 employees

Figure 1.

The organization chart in Fig. 1 presents an overview of, and additional information about, the organizational structure of state geodesy and cartography in China.

In the reorganization in 1982, the Surveying and Mapping National Bureau has been placed under the Ministry of Urban and Rural Construction and Environmental Protection. Under the supervision of this ministry, the Surveying and Mapping Bureau's present tasks are as follows:

--To establish and maintain geodetic control nets (horizontal and vertical control nets, general test areas, etc.);

--To issue national geodetic and cartographic regulations, and detailed professional instructions regarding various products and maps, and to oversee compliance with them;

--To professionally supervise the geodetic and cartographic establishments under other ministries;

--To organize international scientific and technical cooperation and international exchanges;

--To maintain the national basic information on geodesy and cartography (technological archives);

--To develop and spread new technologies;

--To provide higher and secondary education for geodesists and cartographers.

2.0 Geodetic and Cartographic Work in China

2.1 Geodetic Work

The national astrogeodetic control survey has been completed. The national geodetic network comprises first-, second-, third- and fourth-order networks. The arcs of first-order triangulation and the lines of first-order traverse run along the meridians and parallels, 200 kilometers apart. The average length of the sides is 25 km. The maximum mean error of angle is ±0.7".

The second-order network has been established inside the first-order arcs. The average length of the sides is 13 km. The maximum mean error of angle is ±1.0". In all there are about 50,000 second-order points in the network.

The national astrogeodetic network's mutual adjustment was completed in 1982. Third- and fourth-order networks densify the first- and second-order ones.

China's national leveling network likewise comprises first-, second-, third- and fourth-order circuits. The length of a first-order circuit along its perimeter is between 1000 and 1500 km, but 2000 km in mountainous regions. The mean error of closure in leveling, based on leveling over a circuit in both forward and backward directions, is usually better than ±0.5 mm. Of the first-order network with its 100 circuits, over 90,000 km have been surveyed

by the end of 1982. It is planned to resurvey these circuits every 15 years on average. The first-order leveling network is densified by a second-order one, with the following characteristics: the length of a circuit along its perimeter is 500 to 750 km, and the mean error of closure in leveling is ±1.00 millimeter. The combined total length of second-order and third-order leveling is 137,000 km. The mutual adjustment of second-order and third-order leveling will be completed by 1990. Third- and fourth-order leveling already serve practical requirements.

The gravimetric control points are assigned to three orders. The gravimetric control points and the first-order points constitute the national gravimetric control net. The mean error of closure between gravimetric control points is at most ±0.15 mgal; and between first-order points, ±0.25 mgal. A detailed gravimetric survey is underway, using this control net. Computation of the $1^{o} \times 1^{o}$ network's mean anomalies has already been completed.

Studies are being conducted at present on using new procedures (Doppler method, VLBI technology) for modifying and improving the astrogeodetic network.

2.2 Topographic Mapping, Photogrammetry and Remote Sensing

China's topography has been mapped generally on a 1:50,000 scale (but the desert and mountainous regions, on a 1:100,000 scale). A scale of 1:25,000 has been used in mapping certain important regions. The contour interval on the 1:50,000 maps is 5, 10 or 20 meters. The surveys and cartographic work were completed by 1970, but the systematic revision of the maps has already begun. The maps now in use have been produced on the basis of one or two such revisions.

Mapping on a 1:10,000 scale began in the 1960's and is a fundamental task even now (the contour intervals are 1, 2 and 5 m.) Between 1.6 and 1.7 million square kilometers (about a sixth of China's total area) have been mapped on this scale up to now, mostly in the country's eastern half. Naturally, maps are being prepared also on a scale of 1:5000 and 1:1000, of the regions earmarked for development, respectively for use in municipal planning.

So far as the technology is concerned, aerial photographs, analog plotting techniques and single-image photogrammetry are used generally. Also analytical aerotriangulation is already being used. The cartographic work for topographic maps is usually done by scribing on polyester foil.

In analytical aerotriangulation, polynomial block adjustment and the method of independent models are used. The employed programs can be run not only on mainframes of medium size and minicomputers, but on microcomputers as well. The effect of systematic errors on adjustment has been investigated. The detection of gross errors and the use of supplementary data in block adjustment have been studied. It has been demonstrated that the number of minor vertical control points can be halved by introducing also certain supplementary data (a set of condition equations describing a body of water or several field-measured vertical angles, for example).

The Chinese ZS-1 orthoprojector is microcomputer-controlled. It was developed, and is being produced, by the Research Institute of the Surveying and Mapping National Bureau. The usefulness of this instrument has already been proven in production. Wuhan Technical University is considering the development of a completely digital mapping system that will be based on an existing scanning microdensitometer.

Close and local photogrammetry are finding application in many fields (water conservation, energy production, geological exploration, tectonic studies, biology, medicine, archeology, etc.).

The use of remote-sensing technologies and equipment offers new possibilities for the exploration of earth resources and environmental monitoring also in China. The ministries concerned are devoting close attention to the development of remote-sensing technologies. Several kinds of onboard aerial remote-sensing units (infrared and multispectral scanners, and mapping camera) have been developed so far.

The Chinese have interpreted and analyzed photographs they took with their own equipment. On the basis of these results, they have issued aerial photographic remote sensing atlases of Yunnan, Tianjin, Tengchong, Changchun and Sichuan Provinces. They came to the conclusion that false-color versions (color composites) of the Landsat-MSS observations could be made and interpreted digitally. The land use, geological and geomorphological features, forests, farmland and waters in certain regions have been mapped on this basis. Experiments are being conducted more recently also with digital image processing and automatic mapping. The land-use boundary lines have been mapped from Landsat observations, with the help of computer pattern recognition and controlled classification.

The information department of China's National Remote Sensing Center has been merged into the Surveying and Mapping National Bureau's Research Institute, and the latter now provides various space-acquired observations and other information for the Chinese institutions concerned. (As can be seen, this organizational arrangement closely resembles the practice in Hungary! For in our country the FOMI [Institute of Geodesy], as the research institute of the FTH [Geodesy and Cartography Office], supplies the national economy's requirements for high-resolution remote sensing, and it is also the place where the research budgets of the National Technical Development Commission and of the Hungarian Academy of Sciences Intercosmos Council are spent on research in this field.)

In addition, various topical maps and small-scale space photographs have been published in China for the study of resources and the development of individual regions. The entire country's land-use map on a 1:200,000 scale has been completed. Experiments are being conducted with the digital plotting of imagery obtained by remote sensing, the feasibiliy of using space-acquired data for geodetic and cartographic applications, and with developing an image-processing system. China, too, has bought a French-made image analyzer (Pericolor) system, similar to the one that the Hungarian Ministry of Agriculture and Food, and the National Technical Development Commission have procured jointly and installed at the Institute of Geodesy (on Bosnyak Square). At the

research institute in Peking there is also a U.S.-made Colormation equipment for the processing (digitalization and reconstruction) of color images.

2.3 Cartographic Activity

On the basis of the national topographic maps, topographic maps on a 1:200,000 and 1:500,000 scale were completed by the late 1970's, and on a 1:1,000,000 scale as well by the early 1980's.

General geographic maps and reference maps have been made of the country's individual provinces, districts and cities, for the needs of scientific research and planning, and as the background of topical maps. Furthermore, large-size wall maps have been made on a scale of 1:2,000,000, 1:2,500,000, 1:3,000,000, 1:4,000,000 and 1:6,000,000. Geographic maps of the provinces and autonomous regions are being prepared on a scale of 1:250,000, 1:300,000, 1:500,000, 1:1,000,000 and 1:1,500,000. County maps covering about two-thirds of the country's area also are ready.

Under the "four modernizations" program, many kinds of topical maps are being prepared for the needs of science and education. For example, geological, soil, vegetation, transportation, education, health-care and historical maps are being published.

As tourism developed, China has been obliged to prepare a variety of new tourist maps. Today the Map Publishing Enterprise publishes each year more than 100 different kinds of maps, with a combined total run of 30,000,000 copies.

So far as atlases are concerned, we might mention the General Atlas, the Medical Geographic Atlas, the Climatology Atlas, and China's Hydrogeological Atlas. The National Atlas of the People's Republic of China is now being readied for publication. The compilation of provincial and regional atlases has also begun in the provinces and autonomous regions.

The development and results of cartography in China can be summed up as follows:

The country's topographic mapping and the preparation of topical maps have accelerated.

A new map-making technology is spreading. Research into computer cartography began in the early 1970's and has been divided into the following phases: production of hardware, development of computer software, application experiments, and systems development. An initial information system has already been developed and is being used in production. (For example: a system for the analysis and automatic plotting of geographic information, a data base of the boundaries of the administrative subdivisions, a regional environmental information system, cartographic data bases of land reallocation systems, etc.)

The geographic information system contains programs for plotting the traverse data, also programs for plotting the screen data (and programs for conversions between the two kinds of data), a program for multicomponent statistical analysis, programs for geographic analyses and computer mapping, etc.

The following can be said of theoretical research in cartography and the training of cartographers:

In the forefront of the Chinese cartographers' attention is close cooperation with geography, in the interest of fully utilizing the geographic data, applying the laws of geography and developing the cartographic methods employed in geography. For example, Chinese cartographers are investigating the questions of projection, generalization, topical maps, comprehensive mapping, etc. Research has begun recently in new areas of cartographic theory, such as map communication, map use, modern cartographic systems, the structures of cartography, etc.

The quality of training cartographers is improving. To supply the national economy's requirements, to develop cartography and to promote the cause of national educational reform, training at the university level has begun with a modified curriculum and better teaching aids, and postgraduate study has been reinstated. In the course of revising the curriculum, more emphasis has been placed on geography among the core subjects, and also the number of hours per week has been increased for topical cartography, special courses, computer mapping, remote sensing, and cartographic analysis. Special courses have been organized in theoretical cartography, the theory of color maps, and the management of map reproduction. The correspondence courses for cartographic technicians and engineers have improved. Now there are special practical exercises even in professional training at the secondary level.

The following are characteristic of the Chinese cartographers' efforts to further develop cartography in China:

--The revision of general and topographic maps is being accelerated;

--Topical mapping is being reinforced and broadened to include environmental, agricultural, tourist and municipal maps, while national and regional mapping will develop in the direction of comprehensive mapping and the preparation of map series;

--The editing and publication of the various national atlases, and the mapping of natural resources and of their physical state will be accelerated;

--The application of computer cartography and the use of its products will accelerate. As the system is functioning well, the areas of application will have to be broadened: the establishment of information systems, and of data bases for the various special branches, will have to be stepped up;

--The application levels of remote sensing are to be perfected; with the help of analysis and interpretation, analytical maps can be compiled from the data acquired by remote sensing; the digital image-processing systems are being perfected, and complete programs are being provided for them; automatic interpretation and plotting are being developed, and thereby remote-sensing cartography is entering its practical, production phase;

--Theoretical research into map reproduction and new map-making techniques is to be reinforced, and this is expected to improve the quality and speed of reproduction;

--Research into map applications is being intensified; and

--Practical studies in the training of cartographers are being extended.

In the area of compiling and systematizing geographic names, we might mention the following:

The appropriate agencies are in place at the central- and local-government levels. A general survey of geographic names in the areas inhabited by national minorities (Mongolia, Uygur, Tibet, etc.) was begun in the 1970's. The rules of the Chinese phonetic alphabet and for the transliteration of the minority languages have been established. Two romanized works have been published ("The People's Republic of China, 1:6,000,000" and "The Atlas of the People's Republic of China").

China is also participating in the international standardization of geographic names. The Third United Nations Conference on Place Names adopted the pinyin system, and the Chinese government is using it as an international standard for the romanization of Chinese names. The standardization of Chinese geographic names is continuing, and a 31-volume gazetteer will be published by the mid-1980's.

2.4 State of the Art, Development of Engineering Geodesy

Typical of engineering surveys in China today is the fairly extensive use of electromagnetic distance measurement, and of aerial photogrammetry for surveying and mapping tasks, but ground and so-called close photogrammetry are just beginning to spread. In addition, adjustment methods are developing and the use of electronic computers is spreading. The so-called "total station" system has been investigated and is already being used in some places. Automatic plotting techniques are likewise being studied.

Continuous geodetic observation and control are already being employed on several construction projects. At the same time, the standardization of engineering surveys is evolving.

The Chinese institutions and experts concerned with the further development of engineering geodesy are starting out from the following assumptions:

--That electromagnetic distance measurement will fully unfold;

--That modular automatic mapping systems will be developed for section surveys;

--That the photogrammetric process will gradually shift toward automatic plotting;

--That ground and close photogrammetry will spread;

--That cadastral surveys will develop into a land-data information system;

--That the institutions using surveying and mapping products increasingly want digital data and automatic mapping;

--And that the use of minicomputers will become general for adjustments, tests of accuracy, the planning of engineering surveys, and their optimization.

It is likewise deemed important to utilize also in the area of management the possibilities that computers provide, and to replace practical management with scientific management.

Within the framework of reforming standardization, it is felt that the various regulations and instructions will have to be brought closer to one another.

The Chinese consider it important to ensure as soon as possible, through import or domestic production, the instruments for the formulated development projects.

3.0 Development, Production of Instruments

This is an area about which it is rather difficult to present a satisfactory picture. The reason is partly that hardly anything is being published on this subject, and partly that we have been able to obtain only incomplete information even in the course of our consultations.

An important fact nevertheless is that China began the production of geodetic instruments already in the 1950's. At present the Chinese are making most of their own conventional geodetic instruments, but the instruments for first-order work are in part Chinese-made and in part imported. The instrument factories of the Surveying and Mapping National Bureau are making mainly photogrammetric instruments and certain special items of equipment, but they also repair instruments and build the newer prototypes. (In China the production of geodetic instruments is under the professional supervision of the Ministry of the Machine-Building Industry.) Of course, instruments that are used in geodesy as well are being made also at plants other than the instrument factories of the Surveying and Mapping National Office.

In the following we will discuss--in addition to the instruments already mentioned in the preceding sections--a few Chinese (photogrammetric) instruments being made at the instrument factory in Wuxi.

The HCT-2A stereophotogrammetric analog plotting instrument. Built for mapping on a scale of 1:10,000, but can be used also for work on a scale from 1:2000 to 1:5000. Size of image: 23 x 23 cm. Focal length: from 152 to 88.5 mm. Orientation data: base, 60 to 250 mm; κ, $\pm 15^{g}$; ϕ, $\pm 5^{g}$; ω, $\pm 5^{g}$; Φ, $\pm 5^{g}$. The range of model measurements: x, 430 mm; y, 530 mm; z, 126 mm. Total weight of instrument: 500 kg. Plotting error $\leq$ 0.2 mm. Vertical accuracy $m_z/z \leq 1/10{,}000$. About ten instruments are built a year, which of course is not enough to supply China's demand.

The HJ-24 image rectifier. Maximum usable film size: 24 x 24 cm. Magnification: from 0.5X to 3X. Maximum distortion < 0.1 mm. Definition: 65 lines/mm in center, 30 lines/mm in corners. Optical system's resolving power: 120 lines per millimeter.

The HJ-3 image rectifier, electronically controlled, computer-equipped. Maximum film size: 23 x 23 cm. Magnification: from 0.8X to 7X. Tilt $< 3^{o}$. Lens characteristics: f = 149 mm; angle of view 74^{o}; definition 90 lines/mm in center and 56 lines/mm in corners. Maximum distortion: 0.1 mm. Power supply: 220 V. About 20 of these instruments are built a year.

We might also mention the various mirror stereoscopes (the HPF-1, HPF-2A, HPF-2B and HPX-4), the CJ-1 planimeter, the 7003 coordinatograph, and the HPZ-2 stereo interpretoscope (with zoom lens). This last-mentioned instrument has the following characteristics. Zoom range: from 3X to 15X. Field of view: 200 mm. Resolution: 25 to 30 lines/mm at 4X, and 80 to 85 lines/mm at 15X. Movement: 180 mm along x axis, and 210 mm along y axis. External dimensions: 900 x 650 x 470 mm. Weight: 24 kg.

4.0 Scientific Research, Training of Experts

For geodesy and cartography there are two higher education institutions, a technical school, and several vocational schools. The base for higher education in geodesy and cartography is Wuhan University of Geodesy and Cartography (it has been granted university rank only recently, before that it was a college). It is under the supervision of the Surveying and Mapping National Bureau and offers majors in geodesy, cartography, photogrammetry, computer science, and engineering geodesy. Up to now the institute has awarded diplomas to more than 7,000 engineers.

In scientific research, Wuhan University is doing not only applied research but also basic research in geodesy and cartography, and it is developing new instruments and technologies as well.

Diplomate engineers are being trained also at Peking University. Its Engineering Faculty offers majors in engineering geology, engineering geodesy, surveying, and astrogeodesy.

China's Geodesy and Cartography Research Institute (Peking) comprises seven departments. In addition to modernizing conventional geodetic and cartographic technologies, and developing instruments and equipment, the institute is also investigating such fields as satellite geodesy, the digitalization and automation of photogrammetry, cartography and maps, automatic data retrieval, the development of data bases, and remote sensing.

Besides the aforementioned research institute, there is in China also the Geodesy and Geophysics Research Institute of the Chinese Academy of Sciences. Furthermore, the individual production units (enterprises) have their research and development subdivisions. We might mention also the research subdivisions of the provinces, autonomous regions, municipalities, and other ministries. Their main task is to aid the fulfillment of practical tasks.

In conjunction with science and research, it should be noted that China's international relations are becoming ever wider. China at present is active in the following international organizations: the International Society for Photogrammetry and Remote Sensing (ISPRS), the International Cartographic Association (ICA), the International Federation of Land Surveyors (FIG), and the pertinent organizations of the United Nations.

5.0 Chinese Association of Geodesy, Photogrammetry and Cartography

In China, the counterpart of the Hungarian Association of Geodesy and Cartography is the Chinese Association of Geodesy, Photogrammetry and Cartography (hereinafter the Association), which at present has 18,000 members. The Association held its Third National Congress on 13-18 May 1985, in Wuxi. In addition to the 260 Chinese delegates, it was attended by a two-member delegation from Hongkong, an invited guest from West Berlin, an expert from the United States, and a three-member Hungarian delegation.

At the congress, we learned the following about our sister association:

The new leadership, elected to a five-year term, consists of an 88-member Presidium, a 30-member standing committee, a president (Professor Wang Shi-zhuo), a permanent vice president (Dr Chen Jun-yong), three vice presidents (Yu Cang, Sun Xiu-wen and Xu Hon-ze), and two deputy secretaries (one of them a full-time deputy secretary).

The congress streamlined the Association's by-laws and debated the latest efforts for the further development of geodesy and cartography, including the tasks of the Chinese Association that stem from these efforts.

In conclusion it can be established about Chinese geodesy and cartography that significant work has been done for the modernization and mutual adjustment of the geodetic networks, in topographic surveys, and in surveys on a larger scale. Impressive is the program that our Chinese colleagues have set for themselves to modernize and develop geodetic and cartographic activity. We on our part wish them success and hope that effective cooperation between China and Hungary, and between China and the community of socialist countries as well, will become closer.

1014
CSO: 2500/214

APPLIED SCIENCES

NEW 'HAIYAN' SERIES CIVIL AIRCRAFT DETAILED

Beijing GUOJI HANGKONG [INTERNATIONAL AVIATION] in Chinese No 1, Jan 86 pp 10-11

[Article by Lin Yuanzeng [2651 0337 2582]]

[Text] In April 1985, in response to the needs of national development, the Nanchang Aircraft Manufacturing Co. decided to convert the "Chu Jiao-6" [Primary trainer, CJ-6] to a multi-purpose aircraft for agricultural and forestry use; it was designated the "Haiyan-A."

The CJ-6 is a Chinese-made aircraft which has been in production on a large scale. It has good flight performance and good control characteristics; it is also safe and reliable, and easy to maintain. The aircraft has received praise from users both at home and abroad, and received the national gold award for high quality in 1979.

The CJ-6 is a two-seat, single-engine propeller aircraft. It has a low wing with an all-metal double-spar structure; the wing has variable thickness with a geometric twist, and has a trapezoidal-shaped planeform. The outer wing is removable and equipped with conventional flaps and ailerons. The power plant is a radial, nine-cylinder, aircooled, Huosai-6A engine with a take-off power of 285 hp; it drives a J9-G1 automatic variable-pitch, two-blade metallic propeller. The landing gear is of the retractable tricycle type; the main gear is equipped with low-pressure tires to allow the aircraft to land on grass.

The advantages of converting the CJ-6 to a multi-purpose agricultural and forestry aircraft are as follows:

1. By retaining the same aerodynamic design, the original control stability of the aircraft can be assured without having to perform wind tunnel tests.

2. By retaining the same structural design, the safety and the operating life of the aircraft can be assured without having to perform static tests (the effects of increased take-off weight offset the effects of reduced payload, yielding the same maximum payload).

3. At present, the Huosai-6A engine is the designated power plant; when the Huosai-6E engine (257.3 kW) and the matching propeller are developed, they will replace the existing power plant to further improve aircraft performance.

4. It is easy to recruit pilots. Large numbers of pilots retired from service can readily fly the converted CJ-6.

5. By removing the rear seat, it is possible to store 400 kg of insecticide (600 kg if the storage tank is located in front of the mid-wing) and the spray system. By keeping the rear seat, it is still possible to install a camera and other surveillance equipment. If the rear cabin is used only to store seed, seedlings, and grass seeds, the capacity can be increased to 800 kg.

Based on the experience in developing the CJ-6, the Nanchang Aircraft Manufacturing Co. spent only 3 months in designing the first prototype of "Haiyan-A." It took its first flight on 17 August 1985.

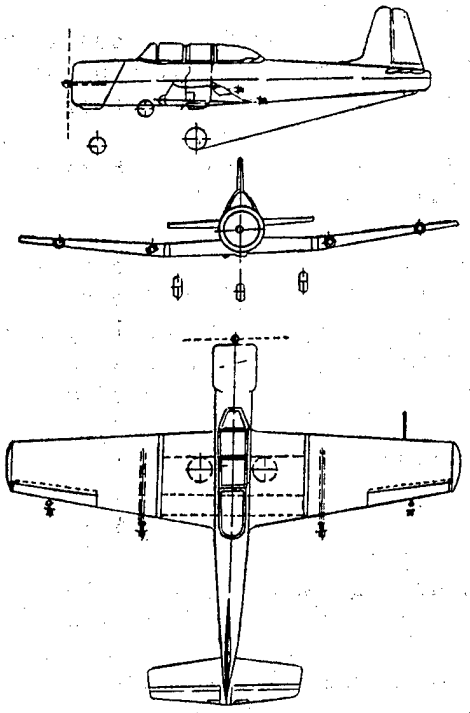
The "Haiyan-A" aircraft uses pressurized fueling technique and sealed insecticide loading procedure to minimize environmental pollution. The insecticide spray system has 751 spray nozzles and uses the LB-4 fuel pump to pump ultra-low concentration and low concentration liquid insecticide. The ground equipment includes special insecticide loading trucks.

Flight tests of the prototype show that the operating altitude can be as low as 1.0 m, the operating speed is 160 km/hr, and the spray width can reach 30 m. Efforts are under way to further improve the take-off and landing characteristics and the spray system. Once these improvements are completed, an application will be submitted to the state for certification.

On the basis of the "Haiyan-A" model, the Nanchang Aircraft Manufacturing Co. is in planning to develop two other special-purpose models:

1. The "Haiyan-B" model, which is a dedicated agricultural and forestry aircraft. The rear cabin contains built-in insecticide storage tanks and special equipment for farming operations, and other on-board equipment are simplified accordingly. The aircraft is primarily used for spraying liquid and powder insecticides, fertilizing, seeding, and extinguishing forest fires.

2. The "Haiyan-C" model, which is a patrol and surveillance aircraft. It has the same aerodynamic shape as the CJ-6; its weight and flight performance are also similar to the original model. Its endurance is increased to over 6 hours by adding two 50-liter fuel tanks. On-board equipment can be added or removed according to user needs. It can be used in such operations as forest surveillance and protection, monitoring fish movement, fishing management, environmental protection and surveillance, mapping, aerial photography, geological exploration and patrolling shorelines and border regions.



Key Technical Data

Dimensions	wing span	10.18 m
	length	8.46 m
	height	3.25 m
Weight	empty weight (normal use)	1,172 kg
	empty weight (farm use)	1,214 kg
	normal take-off weight	1,419 kg
Performance	maximum take-off weight	2,035 kg
	maximum level-flight speed	297 km/hr
	service ceiling	6,250 m
	take-off distance	280 m
	landing distance	350 m
	range	780 km
	endurance	4 hours 11 min.
	minimum operating height	1.0 m

3012/6091
CSO: 4008/46

APPLIED SCIENCES

DETAILS OF THE 'CHANGKONG-1C' RPV CONTINUED IMPROVEMENTS

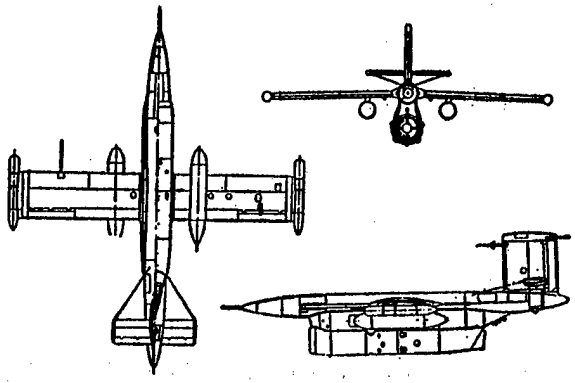
Beijing GUOJI HANGKONG [INTERNATIONAL AVIATION] in Chinese No 1, Jan 86 pp 12-13

[Article by Wang Lue [3769 3970]]

[Text] The "Changkong-1C" is a high-mobility remotely piloted vehicle [RPV] developed by the Nanjing Aeronautical Institute. It is a large, jet-propelled, radio-controlled high subsonic airplane.

The Nanjing Aeronautical Institute began developing the "Changkong-1C" series in the late 60's. At the end of 1976, the "Changkong-1" prototype design was finalized; in 1977, the "Changkong-1A" RPV with an external pod was developed; at the end of 1982, the "Changkong-1B" equipped with auxiliary fuel tanks was developed. The high-mobility "Changkong-1C" is an improved version of the model "B" design. Because of the high mobility requirement, a series of complex structural and systems problems had to be resolved. The Nanjing Aeronautical Institute devoted more than a year in performing wind tunnel tests at high and low speeds, static strength tests, and dynamic tests. The first prototype was built in 1984, and the first flight test took place in September of the same year. Since that time, many additional flight tests have been conducted, and the results show that the "Changkong-1C" meets the requirement of a target drone for a variety of missile types.

The "Changkong-1C" has a typical subsonic configuration with optimized aerodynamic design and properly placed attachment points. The WP-6 engine has a suspended air intake and engine pod to provide good flight performance. Flight test data show that the "Changkong-1C" can fly at speeds of 850-910 km/hr within an altitude range of 500-16,500 m, and perform high-speed maneuvers at a bank angle of 70°. At low and medium altitudes, the endurance can reach 45 minutes, and the range can very between 600 and 900 km according to needs. The overall performance indices of the aircraft are comparable to those of similar drones made abroad.



Design Features

I. Dimensions

Length	8.435 m
Height	2.955 m
Wing span	7.5 m
Wing area	8.55 m^2
Total weight	2,450 kg

II. Structural Layout

The fuselage has three sections. The front and rear sections are equipment compartments made of aluminum; the front compartment contains electronic equipment and the rear compartment contains the autopilot and the control system. The mid-section is a cylindrical steel fuel tank. The engine is suspended below the fuselage. The aircraft has a rectangular mid-wing design; the wing cross-section is nonsymmetric, with a 2° dihedral and 0.75° angle of incidence. The horizontal stabilizer is located in the middle of the vertical tail; they are rectangular surfaces with symmetric cross sections.

III. Equipment

1. Radio equipment. The "Changkong-1C" is equipped with transponders for receiving signals from the ground and for identification and guidance.

The remote control receiver is used to receive commands from the ground station. The radio has a decoder which can transmit the control command to the autopilot and other control equipment.

In order to monitor the operation of the automatic control system and other special equipment, the RPV is equipped with a radio telemetry system which can provide continuous readings of speed, altitude, angle of attack, engine temperature, and engine speed to the ground controller.

2. Autopilot. It is used to stabilize and control the flight path of the RPV by radio remote control from the ground station; it has four channels for controlling the pitch, roll, bearing, and altitude.

3. Electric equipment. The main power supply is an engine-driven d.c. generator which provides a.c. electricity through a converter. There is also a Silver-Zinc battery which can be used as an alternate power source in case of engine trouble.

4. Miss distance indicator. It includes the antenna and the transponder, and provides information to the ground station to measure missile accuracy during test.

IV. Fuel Supply System

The RPV has a pressurized fuel supply system. The fuel tank in the mid-section of the fuselage has a capacity of 600 kg. The total fuel capacity including two auxiliary fuel tanks under the wing is 840 kg.

V. Power Plant

The power plant is a converted WP-6 engine where the adjustable jet nozzle is replaced by a fixed nozzle with a downward tilt of 8°. The thrust level is adjusted by varying the engine speed; maximum static thrust is 2,600 kg.

VI. Operation

1. Take-off and flight operation. The "Changkong-1C" is launched from a retrievable undercarriage. The aircraft is situated on three short rails and is attached to the undercarriage by a thrust latch beneath the engine. During take-off, the entire aircraft-undercarriage assembly is propelled by the engine thrust to glide along the runway. When the speed reaches 285 km/hr, the thrust latch is automatically released by the cold air system on the undercarriage whereby the aircraft separates from it and begins to climb. At this time the undercarriage slows down and radio commands are sent to deploy the braking chute and to activate the brakes until the undercarriage is stopped. The undercarriage can be reused a number of times.

During the first 85 seconds after take-off, flight control is accomplished by a preprogrammed, on-board control unit. Afterwards, the navigator on the ground takes over the control through radio commands based on data obtained from the radar graphic display and other measurement instruments. Each flight is carried out according to a predesignated flight path.

2. Retrieval. The "Changkong-1C" can reenter the target zone two to three times. If it is not shot down during the test, it can be guided by radio commands to return to the landing field. Upon entering the retrieving area, the RPV automatically pulls up to an altitude of 500 m, and then begins an unpowered glide to the ground. The impact energy is partially absorbed by the engine pod and the jet nozzle so that the main body can be recovered. After necessary repairs, the RPV will again be ready for service.

3012/6091
CSO: 4008/46

Applied Mathematics

MATHEMATICAL MODEL OF THREE-SHAFT MARINE GAS TURBINE AND ITS DYNAMIC ANALYSIS

Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11 No 4, Oct 85 pp 351-357

[Article by Ni Weidou [0242 4850 2435] and Xu Xiangdong [1776 0686 2639] of the Themal Energy Engineering Department, Qinghua University]

[English Abstract] A detailed dynamic model for three-shaft marine gas turbine is established. The suggested calculation method uses the unsteady operation regime as the initial point of linearization, and every step initiates with new coefficient matrices from the unsteady regime obtained by the previous step. Consequently, with some modifications, a linear model can be used to calculate the transients of the nonlinear systems under large perturbations. This method is a useful tool for design, parameter optimization and site adjustment of control systems. The computer program based on this method is versatile, and can be used for estimating dynamic behavior of gas turbines of different types under small or large perturbations, and also, for steady performance study of the gas turbines. (Paper received 30 May 1983.)

References:

[1] 倪维斗、彭容，分轴燃气轮机的状态空间数学模型及控制系统动态分析通用程序，仪器仪表学报，3，No. 1，1982.
[2] Weiner D., Aschner F. S., Davan, J., Nonlinear Digital Simulation and Minimun Fuel Control of a Jet Type Gas Turbine Power Generating Unit, ASME, 78-GT-43.
[3] 张世铮，燃气热力性质的数学公式表示法，工程热物理学报，第1卷，第1期，1982.
[4] 倪维斗，燃气轮机的气道在过渡过程中的热交换对动态特性的影响，自动化技术，1978，3.

/9365
CSO: 4009/1041

Communications

SINGLE MODE BANDWIDTH OF RECTANGULAR DIELECTRIC IMAGE WAVEGUIDE

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 1-7

[Article by Shi Meiqi [0670 5019 3825] and Jiang Dinghua [5592 1353 5478] of Beijing University]

[English Abstract] The property of the characteristic equations of the rectangular dielectric image waveguide is analyzed. The following conclusions are obtained: (1) E^{y}_{11} mode is the only mode without a cutoff frequency; therefore the lowest order mode must be E^{y}_{11} mode when geometric sizes a and b and relative dielectric constant ε_r are chosen arbitrarily; (2) a cutoff frequency of E^{x}_{12} mode can be determined directly by using the formula $f_{es} = C/(4b\sqrt{\varepsilon_r - 1})$; (3) the height B of the normalized waveguide corresponding to single mode region must be smaller than 1. A series of calculated results are all in accord with the above-mentioned conclusions. (Paper received 17 February 1986.)

References:

[1] P. P. Toulios and R. M. Knox, Rectangular dielectric image lines for millimeter integrated circuits. Presented at the Western Elec. Show and Conv. Los Angeles calif, Aug. 25~28,1970.

[2] R. M. Knox and P. P. Toulios, Integrated circuits for the millimeter Wave through Optical frequency range, in Proc, Symp, Submillimeter Waves. Brooklyn, NY: Polytechnic Press, Apr. 1970, pp. 496~516.

[3] 吴万春 毫米波集成介质波导，电子科学技术，1981.10. pp. 11~14.

[4] 王宗欣、赵惠芬，陶瓷介质波导的设计与参数测量，复旦学报，21卷第1期，1982.3, pp. 43—51.

[5] J. A. Paul and Y. W. Chang Millimeter-Wave image guide integrated passive devices, IEEE. Trans. Microwave Theory Tech, Vol. MTT-26, pp. 751~754, Oct. 1978.

[6] K. Solbach and I. Wolfe, The electromagnetic fields and the phase constants of dielectric image lines, IEEE. Trans. Microwave Theory Tech. Vol. MTT-26, pp. 266~274, Apr. 1978.

/9365
CSO: 4009/1042

ON PERFORMANCES OF BRANCHING FILTER WITH MICROWAVE DIRECTIONAL COUPLERS

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 8-15

[Article by Lin Fuhua [2651 4395 5478] and Zhuang Kunjie [8369 2492 2638] of Nanjing Institute of Technology]

[English Abstract] An integrated branching filter composed of two 3-dB directional couplers is proposed. Analysis and experiments show that the performance of the channel branching behavior will be deteriorated, if the couple of the coupled bridge differs from the standard value or the frequency differs from its center frequency. Besides, the uniformity of the attenuation and phase characteristics of two filters in the pass-band or the stop-band have a stronger effect on branching isolation. Moreover, the phase and the delay characteristics of the Tchybysheff pass-band filter are discussed, and the frequency modulation distortions, the differential gain, the differential phase and the group delay in the branching filter are given. (Paper received 8 March 1984.)

References:

[1] E. A Marcatili D. L. Bisbee, Band-Splitting Filter, B.S.T.J, Vol. XL, January, 1961. p.p. 197~212.
[2] Jones,E.M.T and Bolljahn, J. T, Coupler Strip Transmission Line Filter and Directional Couplers IEEE MTT-Vol. 4, April, 1956, p.p. 75~81.
[3] J. Lange, Interdigital Strip-Line Quadrature Hybrid, 1969, G-MTT, Int. Microwave Symp. pp. 10~13.
[4] R. Waugh and D Lacombe, Unfolding the Lange Coupler, IEEE. Trans. On MTT, p.p 777~779, Nov. 1972.
[5] A. Podell, A High Directivity Microstrip Coupler-Technique, 1970, G-MTT, Int. Microwave Symp p.p. 33~36.
[6] 黄席椿、高顺泉，滤波器综合设计原理，人民邮电出版社。
[7] 松本高士[日]，彩色电视的微波传输，人民邮电出版社，1978。
[8] 吴伯修、庄昆杰、林福华、何立权，实验性、集成化、积木化微波通信系统，南京工学院学报，1981，No. 3.
[9] 庄昆杰、林福华，积木化微波系统和集成化功能组件，通信学报，1983. 10. No. 4.

/9365
CSO: 4009/1042

NEW TYPE OF UHF WIDEBAND FM OSCILLATOR WITH FREQUENCY STABILIZED USING IF PHASE-LOCKED LOOP

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 16-25

[Article by Wu Boxiu [0702 0130 0208], Wu Zhihe [1566 0037 7729], and Shen Lianfeng [3088 6647 0023] of Nanjing Institute of Technology]

[English Abstract] A new type of UHF wideband FM oscillator is proposed. Its center frequency is controlled by a crystal-stabilized IF double-locked loop, so that it can produce linear FM oscillation with frequency stability approaching the stability of crystal oscillator.

The mathematical model of this kind of oscillator is established. Its main characteristics are analysed. The conditions of stabilizing the center frequency and the selection of the loop parameters of this scheme are given.

The experimental unit is made of microwave mixed IC. It was proven that this type of FM oscillator has the advantages of purer spectrum, larger peak-to-peak frequency deviation, better linearity of frequency modulation, smaller amplitude modulation and higher frequency stability than those traditional FM oscillators operating at 70 MHz or 140 MHz. (Paper received 3 November 1983.)

References:

[1] Clarke and Hess, Communication Circurts Analysis and Design, § 11.4, § 11.5.
[2] George F. Bock, Bernard L. Walsh, An RF Linear Modulation Circuit, 1978, IEEE. MTT-S International Microwave Symposium Digest Ottawa, Candda, 27~29 June 1978 pp. 315~317.
[3] Isao HAGA, Shigenobu AIHARA and Motoo MIZUMURA, 6 to 12 GHz Band Microwave Transistor Frequency Modulator, NEC. Res & Dev (Japan) No. 52, pp. 64~71 Jan. 1979.

/9365
CSO: 4009/1042

COMPUTER SIMULATION OF ADAPTIVE DECISION FEEDBACK EQUALIZATION AND VA DECISION ON MULTIPATH TRANSMISSION CHANNEL IN DIGITAL MICROWAVE COMMUNICATION

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 26-34

[Article by Liang Huijun, [4731 1979 0689], Chen Yaoqin, [7115 3852 3830], Xue Fuxing [5641 4395 5281], and Li Shiju [2621 1709 1565] of Zhejiang University]

[English Abstract] For the transition from existing analog communication system to digital, it is suitable to transmit two 3rd level and/or one 4th level of PCM hierarchy digital signal on a microwave channel. Actually, the line-of-sight microwave channel occasionally undergoes multipath fading which introduces intersymbol interference on the transmitting high bit rate digital signal, unless equalization or suitable demodulation is employed. Computer simulation was implemented for 4PSK and 8PSK systems of 140Mbit/s and 34Mbit/s. Intersymbol interference and error rate can be decreased significantly by decision feedback equalizer (DFE) and VA decision equalizer (called VA decision for short), and a system without outage in ordinarily deep fading is obtained. (Paper received 16 June 1983.)

References:

[1] 姚庆栋，陈瑶琴，视距微波信道多径模型，在1983年3月中国通信学会第二次年会上宣读。
[2] A. B. Crowford and W. C. Jakes, BSTJ, Vol. 30, pp. 68～90, Jan. 1952.
[3] O. E. Delarge, BSTJ, Vol. 30, Jan. 1952. pp. 91～103.
[4] C. L. Ruthroff, BSTJ, Vol. 50, No. 7, 1971, pp. 2375～2398.
[5] L. J. Greenstein and V. K. Probhu, IEEE, Vol. Com 27, No. 1, pp. 68～75, Jan. 1979.
[6] W. C. Jakes, IEEE, Vol. Com-27, No. 1, pp. 76～81, Jan. 1979.
[7] W. D. Rummler, BSTJ, Vol. 58, No. 5, pp. 1037～1071, 1979.
[8] W. D. Rummler, ICC' 78, 47.5.1～5.4
[9] 姚庆栋，梁慧君，薛福兴，视距微波数字调相系统的计算机模拟，在1981年10月中国电子学会信息论和通信理论学术讨论会上宣读。
[10] 蔡长年等著，数据传输原理(上)、(下)，人民邮电出版社，1978年。
[11] 鲍德航等著，信号检测理论导论，科学出版社，1977年。
[12] H. L. Berger, H. B. Poza, IEEE, AES-14, No. 1, 1978, Jan. pp. 151～157.
[13] J. H. Stilwall, C. R. Ryan, Conference Record of 1975 International Conf. of Com. Vol. 1, pp. 15.
[14] 李乐民，叶佳祥，数字传输设备中的均衡器，人民邮电出版社，1980年。
[15] L. I. Ruthroff, BSTJ, Vol. 50, No. 5～7.
[16] W. D. Rummler, BSTJ, Vol. 59, No. 5, May-June 1980, pp. 763～796.

[17] 姚庆栋、梁慧君、薛福兴，数字通信的调制解调机助分析与设计，在1980年10月中国电子学会第一次CAD学术讨论会上宣读。
[18] G. Ungerboeck, IBM, Journal of Reseach and Development, Vol. 16, No. 6, Nov. 1972, pp. 546～636.
[19] John G. Proakis, Advance in Equalization for Intersymbol Interference, Advaced in Communication Systems Theory and Application, Vol. 4, pp. 123～198.
[20] 姚庆栋，陈瑶琴，李式巨，"微波多径传输信道中的VA检测"，在1981年10月中国电子学会信息论和通信理论学术讨论会上宣读。
[21] K. S. Shanmugam and P. Balaban, IEEE, Vol. Com. 28, Nov. 1980, pp. 1916～1924.
[22] R. L. Mitchell, IEEE, Vol. AES-17, No. 1, pp. 15～24, 1981.
[23] P. Balaban, BSTJ, Vol. 55, pp. 745～766, July. 1976.
[24] IEEE. Trans, IT-17, pp. 56～66, Jan. 1971.

/9365
CSO: 4009/1042

EFFECT OF LASER NOISE ON RECEIVER PERFORMANCE OF COHERENT FIBER-OPTIC COMMUNICATION SYSTEMS

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 35-43, 25

[Article by Lin Rujian [2651 1172 0313] of Shanghai University of Science and Technology]

[English Abstract] The effect of FM quantum noise of laser sources on the receiver performance in coherent fiber-optic communication systems is dealt with. Based on a statistical model which describes the phase fluctuation of laser field due to the spontaneous radiation as a Wiener process, a modification to the conventional theory of correlation receiver can be made so as to calculate the error rate of ASK, FSK, and PSK coherent demodulator and evaluate the penalty of receiver sensitivity under the condition that the carrier is parasitically frequency-modulated by a stationary Gaussian noise. Numerical results show that if the product $D\tau$ (phase diffusion constant of laser x delay time of carrier recovery circuit of demodulator) is greater than 1, the sensitivity loss of fiber-optic receivers which employ coherent demodulation will be in the order of 10 dB. Therefore laser noise suppression certainly plays a key role in the efforts to fully realize the potential advantage of coherent fiber-optic communication. (Paper received 15 February 1984.)

References:

[1] Y. Yamamoto, "Receiver Performance Evaluation of Various Digital Optical Modulation-Demodulation Systems in 0.5~10 μm Wavelength Region", IEEE J. Quantum Electronics, Vol. QE-16, pp. 1251~1259, Nov. 1980.

[2] S. Saito, Y. Yamamoto, T. Kimura, "Optical Heterodyne Detection of Directly Frequency Modulated Semiconductor Laser Signals", Electron. Lett., Vol. 16, pp. 826~827, Oct. 1980.

[3] S. Saito, Y. Yamamoto, T. Kimura, "Optical FSK Heterodyne Detection Experiments Using Semiconductor Transmitter and Local Oscillator", IEEE J. Quantum Electronics, Vol. QE-17, pp. 935~941, June 1981.

[4] Y. Yamamoto, T. Kimura, "Coherent Optical Fiber Transmission Systems", IEEE J. Quantum Electronics, Vol. QE-17, pp. 919~935, June 1981.

[5] F. Favre, et. al., "Progress Towards Heterodyne-Type Single-Mode Fiber Communication Systems", IEEE J. Quantum Electronics, Vol. QE-17, pp. 897~906, June 1981.

[6] S. D. Personick, "Receiver Design for Digital Fiber Optic Communication Systems, I ", BSTJ, Vol. 52, pp. 843~874, July-August 1973.

[7] M. Sargent III, M. O. Scully, W. E. Lamb, Jr., Laser Physics, Reading, MA: Addison Wesley, 1980.

[8] A. Yariv, Quantum Electronics, John Wiley & Sons, Inc., 1975.
[9] A. Papoulis, Probability, Random Variables and Stochastic Processes, McGraw-Hill, Inc., 1965.
[10] H.Haug, H.Haken, "Theory of Noise in Semiconductor Laser Emission", Z. Physics, Vol. 204, pp. 262~275, 1967.
[11] V. F. Elesin, V. V. Rusakov, "Theory of the Natural Width of a semiconductor Laser Emission Line", Sov. J. Quantum Electronics, Vol. 5, pp. 1239~1242, Oct. 1976.
[12] T. Okoshi, K. Kikuchi, A. Nakayama, "Measurement of Oscillating Spectral Width of Semiconductor Laser", Electron. Lett., Vol. 16, pp. 630~632, 1980.
[13] K. Nemoto, et. al., "Measurement of Spectral Width of Single Longitudinal Mode Semiconductor Laser", presented at the Ann. Meeting of IECE Japan, Sept. 1980, Paper 222.
[14] S. Machida, et. al., "Interference of an AlGaAs Laser Diode Using a 4.15 km Single Mode Fiber Cable", IEEE J. Quantum Electron., Vol. QE-15, pp. 155~157, 1979.
[15] T. Takakura, K. Iga, and T. Tako, "Measurement of Spectral Width of Single Longitudinal Mode Semiconductor Laser", Japan. J. Appl. Phys., Vol. 19, pp. L 725~727, Dec. 1980.
[16] Y. Yamamoto, et. al., "Quantum Phase Noise and Linewidth of a Semiconductor Laser", Electron. Lett., Vol. 17, No. 9, pp. 327~329. April 1981.
[17] T. Okoshi, et. al., "Novel Method for High Resolution Measurement of Laser Output Spectrum", Electron. Lett., Vol. 16, No. 16, pp. 630~631, July 1980.
[18] S. Kobayashi, et. al., "Injection Locking in AlGaAs Semiconductor Laser", IEEE J. Quantum Electron., Vol. QE-17, No. 5, pp. 681~689, May 1981.
[19] J. M. Osterwalder and B. J. Rickett, "Frequency Modulation of GaAlAs Injection Laser at Microwave Frequency Rates", IEEE J. Quantum Electron., Vol. QE-16, pp. 250~252, March. 1980.
[20] F. K. Reinhart and R. A. Logan, "Electrooptic Frequency and Polarization Modulated Injection Laser", Appl. Phys. Lett., Vol. 36, pp. 954~957, June 1980.
[21] R. Wyatt, et. al., "Megahertz Linewidth from a 1.5 μm Semioonductor Laser with HeNe Laser Injection", Electron. Lett., Vol. 18, pp. 292~293, 1982.
[22] T. G. Hodgkinson, et. al., "Experimental 1.5 μm Coherent Optical Fibre Transmission Systems", Ann. Telecommun., 38, No. 1~2, pp. 1/9~9/9, 1983.
[23] L. Goldberg, et. al., "Noise Characteristics in Line- Narrowed Semiconductor Lasers with Optical Feedback", Electron. lett., Vol. 17, No. 19, pp. 677~678, Sept. 1981.
[24] M. W. Fleming and A. Mooradian, "Spectral Characteristics of External Cavity Controlled Semiconductor Lasers", IEEE J. Quantum Electron., Vol. QE-17, pp. 44~59, 1981.
[25] K. Kikuchi, et. al., "Simple Formula Giving Spectral Narrowing Ratio of Semiconductor Laser Output obtained by Optical Feedback", Electron. Lett., Vol. 18, pp. 10~12, 1982.
[26] L. Goldberg, et. al., "Spectral Characteristics of Semiconductor Lasers with Optical Feedback", IEEE J. Quantum Electron., Vol. QE-18, pp. 555~563, 1982.
[27] S. Saito and Y. Yamamoto. "Direct Observation of Lorentzian Lineshape of Semiconduotor Laser and Linewidth Reduction with External Grating Feedback", Electron. Lett., Vol. 17, pp. 325~327, 1981.
[28] R. Wyatt and W. J. Devlin, "10 kHz Linewidth 1.5 μm InGaAsP External Cavity Laser with 55 nm Tuning Range", Electron. Lett., Vol. 19, pp. 110~112, 1983.
[29] K. Miyauchi, et. al., "A Trial 4-Phase PSK Millimeter Wave Transmission System", Rev. ECL, Vol. 23, pp. 55~66, Jan.-Feb. 1975.
[30] J. G. Proakis, Digital Communications, McGraw-Hill. Inc., 1983.

/9365
CSO: 4009/1042

TRANSLATIONAL CHANNEL ASSIGNMENT IN MOBILE RADIO SYSTEMS

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 49-54

[Article by Xin Xiaoming [6580 5135 2494] of Beijing Institute of Technology]

[English Abstract] A method is presented for translational channel assignment, free from intermodulation interference, with a minimum number of frequency channels for either single or cellular service areas in mobile radio systems. An expression which gives the lower bound on the permissible number of frequency channels shows that the radio channel assignment in a single service area is a special case of that in a cellular service area. Tables provided for channel difference sequences can be utilized directly for channel assignment. (Paper received 8 September 1983.)

References:

[1] 张洪斌、张景禄，陆上移动无线电通讯中频率合理使用的几个问题，电子技术应用，1975,No. 4,pp. 12～23,1975, No. 5, pp. 20～26.
[2] W. M. Pannell, Frequency Engineering in Mobile Radio Bands, Granta Technical Editions in association with Pye Telecommunications Ltd, Great Britain, 1979.
[3] 迟惠生，地面移动电话通信的发展，国外电子技术，1980, No. 12, pp. 1～11.
[4] 渡道，自動車電話方式における無線チャネル配列法，信学会 論文志B, Vol. 59～B, No. 3,(1976).
[5] 陈文德、孔 群，移动电台的频率分配问题，通信学报，1983, No. 4, pp. 33～39.
[6] R. Edwards, J. Durkin and D. H. Green, Selection of Intermodulation-Free Frequencies for Multiple-channel Mobile Radio Systems, Proc. IEE, 116, 8, p. 1311(1969).
[7] W. C. Babcok, Intermodulation Interference in Radio Systems Frequency of Occurence and Control by Channel Selection, bell Tech. J., 32, 1, p. 63(1953).

/9365
CSO: 4009/1042

RESEARCH ON nB1C CODE'S APPLICATION IN DIGITAL OPTICAL FIBER COMMUNICATION SYSTEMS

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6 No 2, Apr 85 pp 55-62

[Article by Wang Baotai [3769 1405 1132] of Wuhan Research Institute of Posts and Telecommunications Science]

[English Abstract] An nB1C code is described that is suitably used in digital optical fiber communication systems. This code has less redundancy. It is efficient and convenient to detect error and to quickly realize synchronization by means of "C" bits. The methods of selecting "n" are discussed. The transmission experiment of 5B1C code has been made in 140Mbit/s optical fiber communication systems. Theory and practice show that nB1C code is useful.
(Paper received 30 January 1984.)

References:

[1] "Optical Fiber Digital Transmission Systems for Field Trial" Review of The Electrical Communication Laboratories Vol 27 Number 11～12 1979 pp. 921～922.
[2] D. R Nical, "A 2 km Optical Fiber Communication Trial" IEEE Trans On Com-26, No 7 1978 pp. 1065～1066.
[3] H. Kasai, S. Semoto, M. Matsushita, "PCM Jitter Suppression by Scrambling" IEEE Trans On Com～22, No. 8, 1974 pp. 1114～1121.
[4] 北見"100 Mbit/S 光伝送方式の伝送路符号構成について"信学技報 CS 80～173, p. 8.
[5] 北井"符号パルス列の電力スペクトルの代数計算法"電子通信学会論文誌 Vol 51-A, No 7, 1968, pp.282～289
[6] 吉開範章, MB1C 符号の伝送特性, 信学技報 CS 82～10, pp. 2～4
[7] "建议 G. 918 数字线路段和数字线路系统的一般考虑"«有线传输技术»1981 年第二期, pp. 139～140.
[8] "Optical Fiber Telecommunications" Edited by Stewart E. Miller and Alan G. Chynoweth pp. 642.
[9] "数字光纤通信系统的设计" «光通信研究»待发表.

/9365
CSO: 4009/1042

Communications

CONTEXTUAL INFORMATION ANALYSIS OF REMOTE SENSING IMAGERY

Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11 No 4, Oct 85 pp 413-415

[Article by Wang Chengye [3769 2052 2814] of the Institute of Automation, Chinese Academy of Sciences, and Gong Xiao [7895 2556] of the Space Science and Technology Center, Chinese Academy of Sciences]

[English Abstract] A contextual model is described and analyzed. Comparison is made between its results in classification of remote sensing image data and the results of classification based on spectral information only. Experiments justify that the contextual method provides extreme advantages. (Paper received 19 September 1983.)

References

[1] Haralick, R. M., Statistical and Structural Approaches to Texture, *IEEE Trans. Computer*, 67 (1979), No. 5.
[2] Swain, P. H. Vardeman S. B. and Tilton, J. C. Contextual Classification of Multispectral Image Data, *Pattern Recognition*, 13 (1981), No. 6.
[3] K. S. Fu, Statistical Pattern Classification Using Contextual Information, John Wiley and Sons, New York, 1980.

/9365
CSO: 4009/1041

Computer Applications

CORRECTION OF LATERAL OFFSET WITHIN LANDSAT MSS IMAGERY

Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11 No 4 Oct 85 pp 358-363

[Article by Wang Tianxi [3769 1131 4406] of the Scientific Research Institute for Petroleum Exploration and Development, Beijing]

[English Abstract] A computer technique for correcting lateral offsets within Landsat MSS imagery is introduced. These offset lines were produced by an apparently random line-start problem in the Landsat MSS sensor. Two values are needed to correct the offset: (1) the numbers of the line containing offset, and (2) the number of pixels of offset in the lines. The determination of these values is time-consuming by visual inspection on the display. Therefore, a computer program which makes use of correlation techniques or Sequential Similarity Detection Algorithms (SSDA) has been developed to calculate the above two values automatically, and then perform the required line shifts to correct the offset. (Paper received 18 August 1983.)

References:

[1] Landsat Data User Handbook, Eros Data Center, (1979).
[2] William K. Pratt, Correlation Techniques of Image Registration, *IEEE Trans. on Aerosp Electron. Syst*, AES-**10** (1974), 353—358.
[3] Barnea, D. I. and Silveman. H. F., A Class of Algorithms for Fast Digital Image Registration, *IEEE TRANS ON COMPUTER*, C-**21** (1972), 179—186.
[4] 程乾生,信号数字处理的数学原理,石油工业出版社 (1979年) 234—240.
[5] A. 拉尔斯登, H. S. 维尔夫等,数字计算机上用的数学方法(第二卷),上海人民出版社 (1976), 294—312.

/9365
CSO: 4009/1041

END